

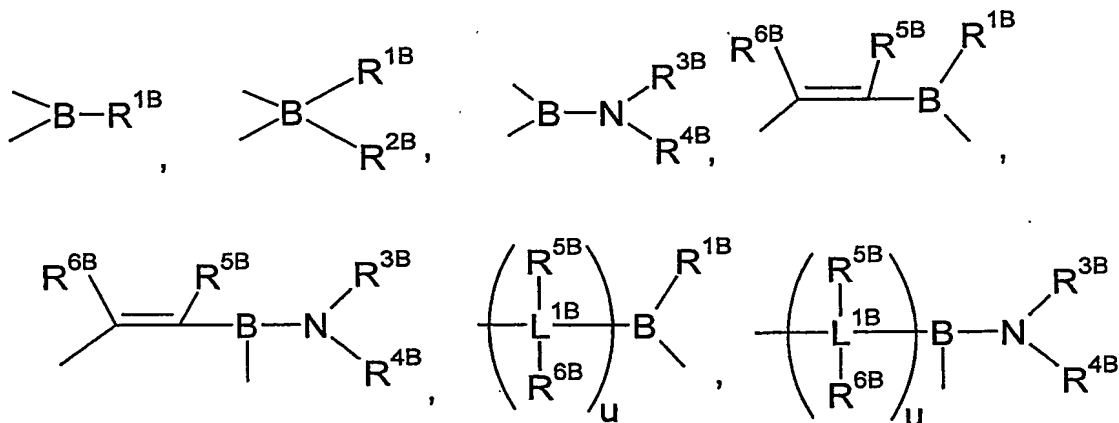
We claim:

1. A monocyclopentadienyl complex in which the cyclopentadienyl system bears at least one uncharged donor bound via a boron-containing bridge and comprising one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements and is bound to a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten.

2. A monocyclopentadienyl complex as claimed in claim 1 which comprises the following structural feature of the formula $(\text{Cp})(-\text{Z}-\text{A})_m\text{M}$ (I), where the variables have the following meanings:

Cp is a cyclopentadienyl system,

Z is a divalent bridge between A and Cp selected from the group consisting of



where

L^{1B} are each, independently of one another, carbon or silicon,

R^{1B}-R^{6B} are each, independently of one another, hydrogen, C₁-C₂₀-alkyl, C₂-C₂₀-alkenyl, C₆-C₂₀-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}₃, where the organic radicals R^{1B}-R^{6B} may also be substituted by halogens and two geminal or vicinal radicals R^{1B}-R^{6B} may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C₁-C₂₀-alkyl, C₂-C₂₀-alkenyl, C₆-C₂₀-aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

u is 1, 2 or 3,

A is an uncharged donor group containing one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements,

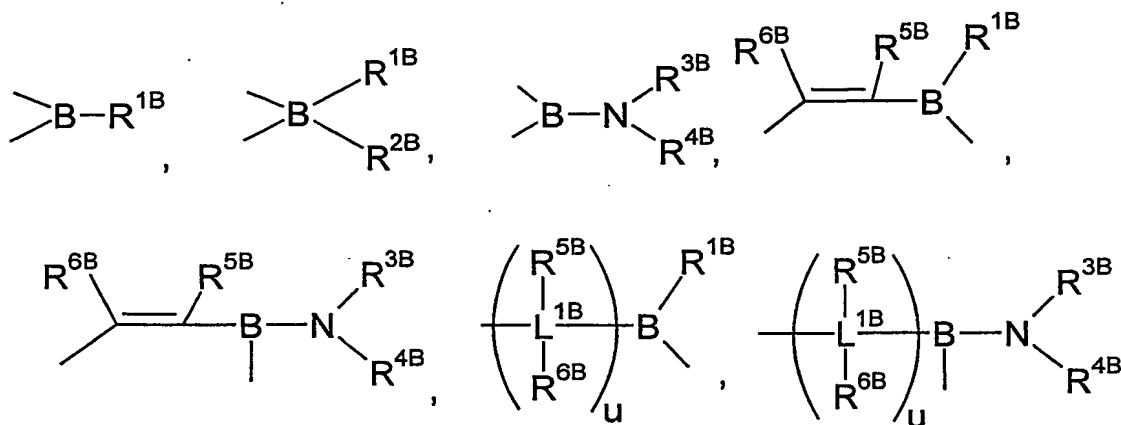
M is a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten and

m is 1, 2 or 3.

3. A monocyclopentadienyl complex as claimed in claim 1 or 2 of the formula $(Cp)(-Z-A)_mMX_k$ (V), where the variables have the following meanings:

Cp is a cyclopentadienyl system,

Z is a divalent bridge between A and Cp selected from the group consisting of



where

L^{1B} are each, independently of one another, carbon or silicon,

R^{1B} - R^{6B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals R^{1B} - R^{6B} may also be substituted by halogens and two geminal or vicinal radicals R^{1B} - R^{6B} may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the

alkyl radical and 6-20 carbon atoms in the aryl radical and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

u is 1, 2 or 3,

5

A is an uncharged donor group containing one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements,

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M is a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten,

m is 1, 2 or 3,

15

X are each, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1 - C_{10} -alkyl, C_2 - C_{10} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^1R^2 , OR^1 , SR^1 , SO_3R^1 , $OC(O)R^1$, CN, SCN, β -diketonate, CO, BF_4^- , PF_6^- or a bulky noncoordinating anion,

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R^1 - R^2 are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^3_3 , where the organic radicals R^1 - R^2 may also be substituted by halogens and two radicals R^1 - R^2 may also be joined to form a five- or six-membered ring,

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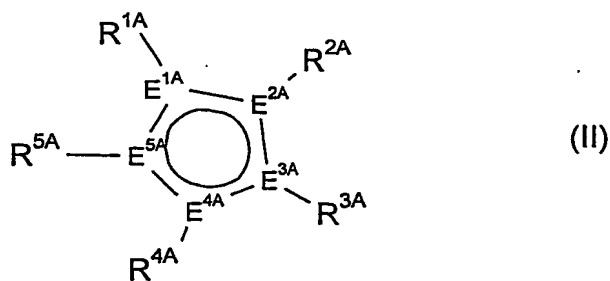
R^3 are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^3 may also be joined to form a five- or six-membered ring and

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k is 1, 2, or 3.

4. A monocyclopentadienyl complex as claimed in claim 2 or 3, wherein the cyclopentadienyl system Cp has the formula (II):

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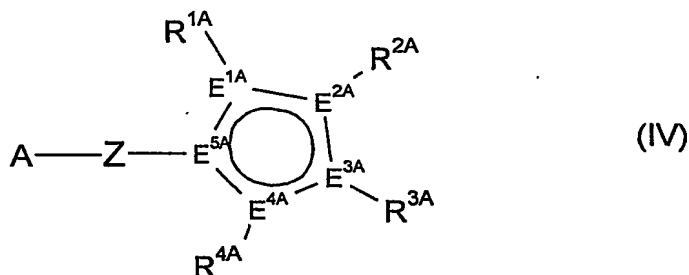
where the variables have the following meanings:

$E^{1A}-E^{5A}$ are each carbon or at most one E^{1A} to E^{5A} is phosphorus,

5 $R^{1A}-R^{5A}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A}_3)_2$, OR^{6A} , $OSiR^{6A}_3$, SiR^{6A}_3 , BR^{6A}_2 , where the organic radicals $R^{1A}-R^{5A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{5A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{5A}$ are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S, with 1, 2 or 3 substituents, preferably 1 substituent, $R^{1A}-R^{5A}$ being a group -Z-A, and

15 R^{6A} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring.

20 5. A monocyclopentadienyl complex as claimed in any of claims 2 to 4, wherein the cyclopentadienyl system Cp together with -Z-A has the formula (IV):



where the variables have the following meanings:

$E^{1A}-E^{5A}$ are each carbon or at most one E^{1A} to E^{5A} is phosphorus,

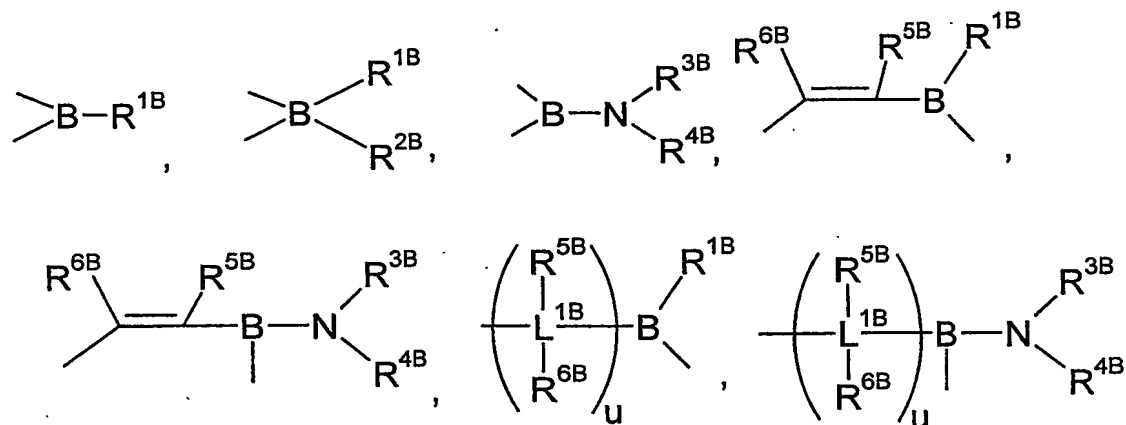
30 $R^{1A}-R^{4A}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A}_3)_2$, OR^{6A} , $OSiR^{6A}_3$, SiR^{6A}_3 , BR^{6A}_2 , where the organic radicals $R^{1A}-R^{4A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{4A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{4A}$ are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S,

40 R^{6A} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20

carbon atoms in the aryl part and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring,

A is a donor group containing one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements,

Z is a divalent bridge between A and Cp selected from the group consisting of



where

L^{1B} are each, independently of one another, carbon or silicon,

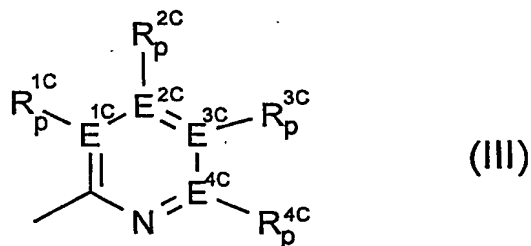
R^{1B} - R^{6B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals R^{1B} - R^{6B} may also be substituted by halogens and two geminal or vicinal radicals R^{1B} - R^{6B} may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical and two radicals R^{7B} may also be joined to form a five- or six-membered ring and

u is 1, 2 or 3.

6. A monocyclopentadienyl complex as claimed in any of claims 2 to 5, wherein A is an unsubstituted, substituted or fused, heteroaromatic ring system.

7. A monocyclopentadienyl complex as claimed in any of claims 2 to 6, wherein A has the formula (III):



where the variables have the following meanings:

$E^{1C}-E^{4C}$ are each carbon or nitrogen,

$R^{1C}-R^{4C}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{5C}_3 , where the organic radicals $R^{1C}-R^{4C}$ may also be substituted by halogens or nitrogen and further C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{5C}_3 groups and two vicinal radicals $R^{1C}-R^{4C}$ or R^{1C} and Z may also be joined to form a five- or six-membered ring,

R^{5C} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{5C} may also be joined to form a five- or six-membered ring and

p is 0 when $E^{1C}-E^{4C}$ is nitrogen and 1 when $E^{1C}-E^{4C}$ is carbon.

8. A monocyclopentadienyl complex as claimed in any of claims 1 to 7, wherein Z is selected from the group consisting of BR^{1B} , $BNR^{3B}R^{4B}$, $C(R^{5B}R^{6B})-BR^{1B}$ and $C(R^{5B}R^{6B})-BNR^{3B}R^{4B}$.

9. A monocyclopentadienyl complex as claimed in any of claims 1 to 8, wherein M is chromium.

10. A catalyst system for olefin polymerization comprising

- A) at least one monocyclopentadienyl complex as claimed in any of claims 1 to 9,
- B) optionally, an organic or inorganic support,
- C) optionally, one or more activating compounds,

D) optionally, one or more catalysts suitable for olefin polymerization and

E) optionally, one or more metal compounds containing a metal of group 1, 2 or 13 of
the Periodic Table.

11. A prepolymerized catalyst system comprising a catalyst system as claimed in claim 10 and
one or more linear C₂-C₁₀-1-alkenes polymerized onto it in a mass ratio of from 1:0.1 to
1:1 000 based on the catalyst system.

12. The use of a catalyst system as claimed in claim 10 or 11 for the polymerization or
copolymerization of olefins.

13. A process for preparing polyolefins by polymerization or copolymerization of olefins in the
presence of a catalyst system as claimed in claim 10 or 11.